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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/700,295	11/03/2003	Michael E. Badding	SP03-079A	6519

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EXAMINER	
WALKER, KEITH D	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 08/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/700,295	BADDING ET AL.	
	Examiner	Art Unit	
	Keith Walker	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *19 May 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) *13-28* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 May 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Acknowledgement is made to claims 13-28 being withdrawn leaving amended claims 1-12 for examination.

Due to the amendments of claims 1-9, claims 2-9 will be re-joined with the original group I, claims 1 & 10-12, of the restriction. Claims 1-12 will be examined as discussed below.

Drawings

The amended drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters 56, 56' and a question mark "?" have both been used to designate the same interconnect piece. It is unclear from the specification what is described by the "?".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1 & 10-12 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6,428,920 (Badding).

Regarding claims 1, 2, 4 & 5, Badding discusses an electrolyte sheet with one surface coated with a roughened nano-crystalline layer (Abstract), where the layer is less than two microns in thickness (Col. 4, ll. 64-67). The electrolyte sheet then has variations in thickness of at least 0.5 microns. The roughened layer allows more surface area for the oxygen ions into the electrolyte, therefore, the roughened side faces the cathode side and the smooth side faces the anode (7:11-13). Badding teaches a dense electrolyte layer and then describes either a dense or porous layer. Suggesting a dense layer as an alternate to a porous layer would indicate the dense electrolyte layer as being a substantially non-porous layer (5:44-47, 6:24-26). As pointed out in applicant's specification, it is known to have a higher flow of air across the cathode, creating greater compressive force on the high-pressure side (air side) and a greater tensile force on the fuel side. So it is inherent that the fuel cell, taught by

Badding, has a predominately compressive force on the air side and tensile force on the fuel side.

Regarding claims 7-9, the electrolyte layer is preferably 5-20 microns thick (4:1-7).

Regarding claim 10, a polycrystalline ceramic sheet is used consisting of partially stabilized or stabilized zirconia that is doped with a dopant selected from the group consisting of the oxides of Y, Ce, Ca, Mg, Sc, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, In, Ti, Sn, Nb, Ta, Mo, and W and mixtures thereof (Col. 3, ll. 60-67).

Regarding claims 11 & 12, a flexible electrolyte sheet with a thickness of 5-20 microns is described (Col. 4, ll. 1-5).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 & 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Publication 2003/0165732 A1 (McElroy) in view of US Publication 2001/0044043 (Badding) and evidenced by US Patent 4,874,678 (Reichner).

Regarding claims 1 & 2, McElroy teaches a ceramic electrolyte with at least one non-uniform surface, where the surface is textured with a plurality of protrusions having a height of 0.5 to 2.5 microns (Para. [0187]). As pointed out in applicant's specification,

it is known to have a higher flow of air across the cathode, creating greater compressive force on the high-pressure side (air side) and a greater tensile force on the fuel side. So it is inherent that the fuel cell, taught by Badding, has a predominately compressive force on the air side and tensile force on the fuel side.

Regarding claim 10, a ceramic electrolyte comprising yttria stabilized zirconia (Para. [0189]).

McElroy doesn't directly teach to the thickness of the electrolyte or to the electrolyte having a substantially non-porous body.

Regarding claims 11 & 12, Badding teaches the use of a flexible ceramic electrolyte with the thickness in the range of 5-20 microns (Para. [0042]).

The motivation to modify the electrolyte thickness of McElroy is to enhance the thermal shock resistance and electrochemical performance.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of McElroy with the electrolyte thickness as taught by Bedding, since it would have enhanced the thermal shock resistance and electrochemical performance.

As mentioned above, McElroy does not speak directly to the electrolyte body being non-porous but does teach using yttria-stabilized zirconia ([0189]). Badding teaches a typical solid oxide fuel cell including a dense electrolyte of yttria-stabilized zirconia sandwiched between porous electrodes ([0003-0004]). By describing the electrode as being porous and the electrolyte as dense, one of ordinary skill in the art would infer this to be a substantially non-porous body. Reichner also teaches a non-

porous solid electrolyte that is typically yttria-stabilized zirconia (4:12-15). As evidenced by Reichner and Badding, yttria stabilized zirconia is a substantially non-porous electrolyte. Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to use a substantially non-porous electrolyte, such as yttria stabilized zirconia, for the fuel cell as taught by McElroy.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over McElroy, Badding and Reichner as applied to claim 1 above, and further in view of US Patent 6,045,935 (Ketcham).

The teachings of McElroy, Badding and Reichner as described above are incorporated herein.

McElroy, Badding and Reichner do not mention the thickness of the electrolyte tapering down toward the outer edges.

Ketcham teaches using yttria stabilized zirconia electrolyte with a non-planer design. The curved design makes the electrolyte thicker in the middle and tapers down to be thinner at the edges (1:65-2:6). The motivation to use the non-planer design is to produce a fuel cell with better thermal shock and thermal cycling resistance.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the electrolyte of McElroy with the non-planer design of Ketcham to improve the life of the fuel cell by increasing the thermal shock and thermal cycling resistance of the fuel cell.

Response to Arguments

6. Due to amendments, applicant's arguments with respect to claims 1, 2 & 10-12 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that the electrolyte of Badding is not a substantially non-porous body. As discussed above, the electrolyte substrate is a dense yttria stabilized zirconia, which is substantially non-porous.

Applicant also argues neither McElroy nor Badding teach the smooth side experiencing tensile force and the textured surface a compressive force. As discussed above, the forces on each of the sides is an inherent property of the fuel cell as the air flows across the textured side and fuel across the smooth side.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Walker whose telephone number is 571-272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KW

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER